REMARKS

Claims 13 through 17 are now presented for examination. Claim 15 has been cancelled without prejudice or disclaimer of subject matter. Claim 13 has been amended to define still more clearly what Applicants regard as their invention, in terms which distinguish over the art of record. Claims 16 and 17 have been added to assure Applicants of the full measure of protection to which they deem themselves entitled. Claim 13 is the only independent claim.

The disclosure has been objected to in that the phrase "and numeral 101 indicates a light source 105 for exposure" at lines 21-22 of page 6 is unclear. The objected-to phrase in the substitute specification has been changed to "numeral 101 indicates a light source and numeral 105 indicates a light for exposure"to clarify the disclosure. The substitute specification has also been changed at lines 1 through 4 of page 18 to correct an inadvertent error with respect to reference numerals 214 and 222.

The Examiner has objected to the drawings in that the reference numeral 640 described on line 18 of page 13 is not depicted and that there is no description in the specification of the reference numeral 650 in Fig. 6A. In response, the substitute specification has been amended to refer to "On a glass plate 650 as a photo substrate". Accordingly, the drawings correspond to the disclosure of the specification.

Claim 13 (should be Claims 13-15) has been rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,928,815 (Martin) in view of U.S. patent application publication number 2002/0025479 (Okamoto) in view of U.S. patent application publication number 2002/0105628 (Saito, et al.), and further in view of U.S. patent application publication

number 2003/0211403 (Mizutani, et al.). With regard to the claims as currently amended, this rejection is respectfully traversed.

Independent Claim 13 as currently amended is directed to apparatus that forms a pattern in which a photomask is provided with both a first aperture having a minute width where the main component of transmitted light is evanescent light and a second aperture having a larger width than the first aperture where the main component of transmitted light is propagating light. A substrate to be processed is placed on a sample stand and a photoresist with a film thickness equal to or smaller than the width of the first aperture is formed on the substrate. A light source generates light for exposure and a unit controls the distance between the substrate to be processed and the photomask. The width of the second aperture is smaller than the designed dimension of the photomask.

In Applicants' view Martin discloses a masking device that performs high-resolution photoresist-based lithography in the fabrication of integrated circuits. The device has a cylindrical block made of material transparent to, and manifesting a relatively high index of refraction for, the wavelengths of light to be used in conjunction with it. The mask end of the block is imprinted with a pattern of ridges corresponding to the pattern to be illuminated on the photoresist. The mask end, including the inter-ridge troughs, is covered with a metal film several tens of angstroms thick. The troughs are filled in with a material such as carbon black strongly absorptive of the wavelengths that will emerge from the mask. The sides of the block are covered with a metal cladding sufficiently thick to prevent any light from escaping from the block. The top end of the block, opposite the mask end, is left uncovered. In operation, the block is used in conjunction with a precise positioning mechanism to locate the block in the

horizontal plane and to maintain a very small, but non-zero, distance between the mask ridges and the photoresist layer, such that the photoresist layer is in the near-field of the mask. In this manner, the photoresist can be illuminated with the pattern desired, with a resolution sufficient to produce circuit elements with dimensions much less than the wavelength of light entering the top end of the mask block.

In Applicants' opinion, Okamoto discloses an exposure arrangement in which a predetermined pattern formed on a mask composed of a shielding region and a transparent region is to be transferred onto a specimen to be illuminated by irradiating the mask with a light and irradiating the specimen with the light having passed through the transparent region of the mask. The light emitted from a light source is divided into two lights, and the phases of the two lights immediately after having passed through different portions of said mask are opposed to each other by changing the individual optical lengths for said two lights to reach said mask.

Saito, et al., in Applicants' view, discloses an exposure arrangement in which an object to be exposed and a transparent plate that includes a thin film are arranged within such a range that near field light from the thin film may operate on the object. The thin film has a light transmittance that changes according to the intensity of light of incidence. The object is exposed with the near light generated by projecting a pattern on a mask onto the thin film of the transparent plate.

Mizutani, et al., in Applicants' opinion, discloses a photomask for near-field light exposure that has a transparent substrate, and a shading member on the substrate. The shading member has a mask pattern including an aperture with a width not greater than the wavelength of

light from a light source. The shading member has a thickness that provides a required light intensity right below the aperture in consideration of a relationship with the width of the aperture.

According to the invention of Claim 13 as currently amended, a photomask has a first aperture with a minute width so that the main component of transmitted light is evanescent light and a second aperture having a larger width so that the main component of transmitted light is propagating light. The thickness of photoresist formed on a substrate to be exposed is equal to or smaller than the width of the first aperture and the width of the second aperture is smaller than the designed dimension of the photomask. Advantageously, the spread of a pattern by the propagating light is avoided by making the size of the second aperture smaller than the size of the pattern actually obtained and the desired pattern is obtained without any irregularity using a photomask with two apertures of different sizes through which evanescent light and propagating light are transmitted, respectively.

Martin may teach a light source and controlling the distance between a substrate and a photomask. As noted by the Examiner, Martin does not teach an aperture for evanescent light, an aperture for propagation light and a photoresist film thickness equal to or smaller than the width of the aperture for evanescent light. Further, Martin is devoid of the feature of Claim 13 of the width of the aperture for propagating light being smaller than a designed dimension of the photomask so that spreading of the pattern is avoided.

Okamoto may teach a sample stand and a stage but is limited to an arrangement that divides light emitted from a light source into two lights so that the two lights immediately after having passed through different portions of the mask may have their phases opposed to each other by changing the individual optical paths for said two lights to reach said mask; and

composing the two lights and irradiating the specimen with the composed light. There is no suggestion in Okamoto with respect to both apertures of evanescent light and propagating light, control of photoresist film thickness to be less than the width of the aperture for evanescent light or the feature of the width of the aperture for propagating light being smaller than a designed dimension of the photomask.

Saito, et al. may disclose the use of a photomask that utilizes evanescent light from a fine aperture to locally expose a photoresist beyond the limit of the light wavelength. There is, however, no suggestion in Saito, et al. of the width of the aperture for propagating light being smaller than a designed dimension of the photomask so that spreading of the pattern is avoided as in Claim 13.

Mizutani, et al. may disclose an exposure arrangement using near field light in which the light intensity under an aperture of plural apertures is controlled by changing the thickness of a light shielding member. The Mizutani, et al. disclosure is directed to determining the thickness of the shading member which includes plural apertures being made so that the difference in light intensity from the different apertures is minimized but is devoid of any suggestion of a relationship between the width of an aperture and the designed dimension of the photomask as in Claim 13. Accordingly, Mizutani, et al. fails to suggest the feature of the use of a photomask with both an aperture of minute width for mainly transmitting evanescent light and an aperture of greater width for mainly transmitting propagating light in combination with the feature of the width of the aperture transmitting propagating light being smaller than a designed dimension of the photomask as in Claim 13.

With regard to the cited combination, neither Martin nor Okamoto in any manner teaches or suggests arrangements for using evanescent light. Saito, et al. fails to recognize the problem of transmitting light through an aperture of minute width for transmitting evanescent light nearby a wider aperture for transmitting propagating light. Mizutani, et al. may teach plural apertures transmitting evanescent light but does not consider any arrangement for a minute width aperture for transmitting evanescent light nearby a greater width aperture for transmitting propagating light. None of the cited references in any manner suggests the feature of use of both an aperture for transmitting mainly evanescent light and an aperture for transmitting mainly propagating light combined with the feature of width of the aperture transmitting propagating light being smaller than a designed dimension of the photomask as in Claim 13.

As a result, it is not seen that the addition of Mizutani, et al.'s use of different apertures for transmitting evanescent light without any consideration of the designed dimension of the photomask and Saito, et al.'s utilization of evanescent light from a fine aperture to the arrangements of Martin and Okamoto which are devoid of any suggestion of both evanescent light apertures and propagating light apertures could possibly suggest the feature of Claim 13 that in a pattern forming apparatus, a first aperture in a photomask of minute width transmits mainly evanescent light and a second aperture in the photomask of greater width transmits mainly propagating light and the width of the second aperture is smaller than a designed dimension of the photomask. Accordingly, it is believed that Claim 13 as currently amended is completely distinguished from any combination of Martin, Okamoto, Saito, et al. and Mizutani, et al. and is allowable.

New Claims 16 and 17 depend from independent Claim 13 and recite further features of the invention which have support from line 21 of page 8 to line 2 of page 9 in the specification as originally filed. No new matter is believed to have been added.

For the foregoing reasons, Applicants submit that the present invention, as recited in independent claim 13, is patentably defined over the cited art, whether that art is taken individually or in combination.

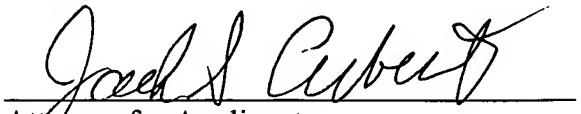
Dependent claims 14, 16 and 17 also should be deemed allowable, in their own right, for defining other patentable features of the present invention in addition to those recited in their respective independent claims. Further individual consideration of these dependent claims is requested.

Applicants further submit that the instant application is in condition for allowance. Favorable reconsideration, withdrawal of the rejections set forth in the above-noted Office Action and an early Notice of Allowance are requested.

Applicants also request that the Examiner contact his undersigned representative should any matters be deemed outstanding precluding allowance of this application.

Applicants' attorney, Steven E. Warner, may be reached in our Washington, D.C. office by telephone at (202) 530-1010 All correspondence should continue to be directed to our address given below.

Respectfully submitted,



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